

National Research Survey Programme

Lakes 2019

Cloon Lough

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Iascach Intíre Éireann
Inland Fisheries Ireland



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National Research Survey Programme

**Fish Stock Survey of Cloon Lough,
September 2019**

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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Cover photo: Aerial view of Lough Shindilla, Co. Galway © Inland Fisheries Ireland

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1.1 Introduction

Cloon Lough is situated in the upper Caragh catchment, approximately 10km south of Glencar, Co. Kerry. The lake is surrounded on three sides by the Dunkerron Mountains (peaks of Knocknacusha, Mullaghanattin and Finnararagh).

The lake has a surface area of 77ha and a maximum depth of 25m. Cloon Lough is categorised as typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and low alkalinity (<20mg/l CaCO₃).

Cloon Lough forms part of the Killarney National Park, Macgillicuddy's Reeks and Caragh River catchment Special Area of Conservation (SAC). This SAC encompasses a wide variety of habitats designated under Annex I of the EU Habitats Directive, including blanket bog, alluvial woodlands, alpine heath and both upland and lowland oligotrophic lakes. The site has also been selected for a range of species; Killarney fern, slender naiad, freshwater pearl mussel, Kerry slug, marsh fritillary, Killarney shad, Atlantic salmon, brook lamprey, river lamprey, sea lamprey, lesser horseshoe bat and otter; all species listed on Annex II of the EU Habitats Directive (NPWS, 2005).

Cloon Lough is known to hold a stock of brown trout and from early April the lake holds salmon, with a grilse run up until June (O' Reilly, 2007). Arctic char are also present in the lake.

This report summarises the results of the 2019 fish stock survey carried out on the lake.



Plate 1.1. Cloon Lough

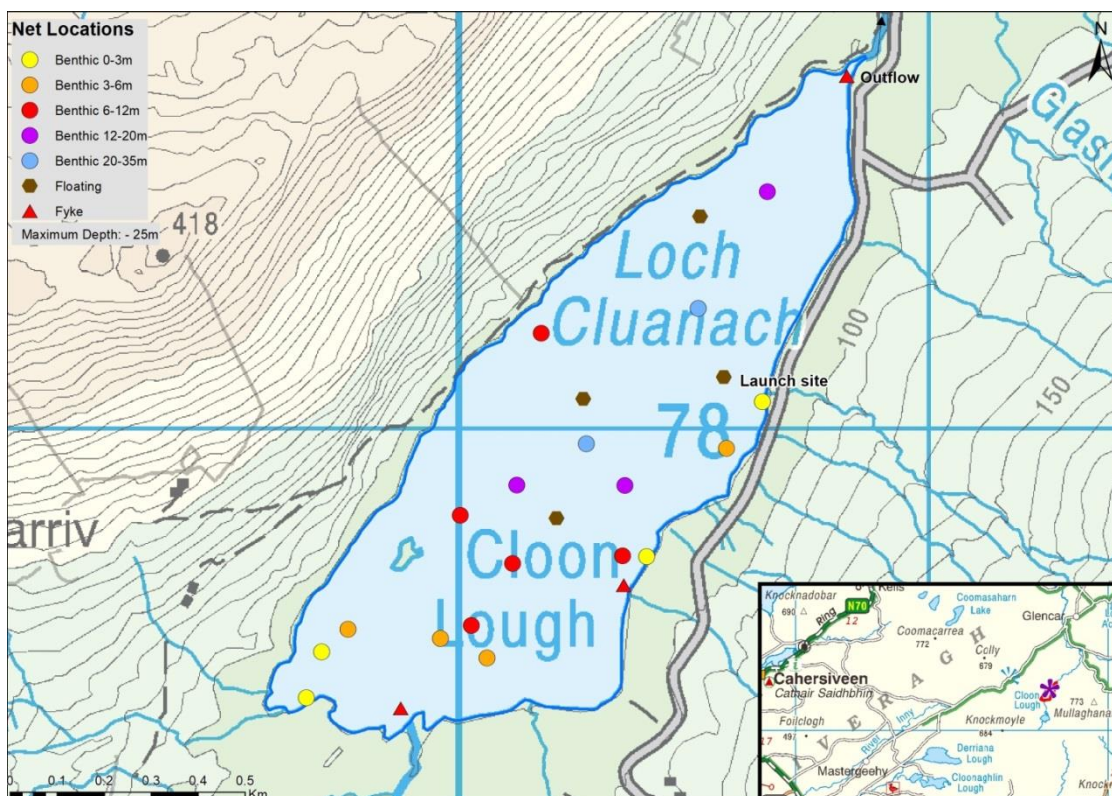


Fig. 1.1. Location map of Cloon Lough showing net locations and depths of each net (outflow is indicated on map)



1.2 Methods

1.2.1 Netting methods

Cloon Lough was surveyed over two nights from the 23rd to the 25th of September 2019. A total of three sets of Dutch fyke nets, 18 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (4 @ 0-2.9m, 4 @ 3-5.9m, 5 @ 6-11.9m, 3 @ 12-19.9m and 2 @ 20-34.9m) and four floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake (25 sites). A handheld GPS was used to mark the precise location of each net. The angle of each survey gill net in relation to the shoreline was randomised.

All fish were measured and weighed on site and scales were removed from all brown trout and Arctic char. Live fish were returned to the water whenever possible (i.e. when the likelihood of their survival was considered to be good). Samples of fish were retained for further analysis. Fish were frozen immediately after the survey and transported back to the IFI laboratory for later dissection.

1.2.2 Fish diet

Total stomach contents were inspected and individual items were counted and identified to the lowest taxonomic level possible. The percentage frequency occurrence (%FO) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\%FO_i = (N_i / N) \times 100$$

Where:

%FO_i is the percentage frequency of prey item i,

N_i is the number of a particular species with prey i in their stomach,

N is total number of a particular species with stomach contents.

1.2.3 Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters. A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff in IFI when moving between water bodies.



1.3 Results

1.3.1 Species Richness

A total of four fish species (sea trout are included as a separate 'variety' of trout) were recorded in Cloon Lough in September 2019, with 381 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most common fish species recorded, followed by Arctic char, eels, salmon and sea trout.

Table 1.1. Number of each fish species captured by each gear type during the survey on Cloon Lough, September 2019

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
<i>Salmo trutta</i>	Brown trout	252	35	17	304
	Sea trout	1	0	0	1
<i>Salvelinus alpinus</i>	Arctic char	44	6	0	50
<i>Salmo salar</i>	Atlantic salmon	2	0	1	3
<i>Anguilla anguilla</i>	European eel	1	0	22	23

1.3.2 Fish abundance

Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species captured in the 2019 survey are summarised in Table 1.2 and illustrated in Figures 1.2 and 1.3. Brown trout were the dominant species in terms of CPUE and BPUE followed by Arctic char, salmon and sea trout (Table 1.2; Figs. 1.2 and 1.3).



Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Cloon Lough, 2019

Scientific name	Common name	Mean CPUE (\pm S.E)
<i>Salmo trutta</i>	Brown trout	0.394 (0.092)
	Sea trout	0.001 (0.001)
<i>Salvelinus alpinus</i>	Arctic char	0.067 (0.015)
<i>Salmo salar</i>	Atlantic salmon	0.003 (0.0020)
<i>Anguilla anguilla</i> *	European eel*	0.122 (0.031)*
		Mean BPUE (\pm S.E)
<i>Salmo trutta</i>	Brown trout	36.042 (8.395)
	Sea trout	0.149 (0.149)
<i>Salvelinus alpinus</i>	Arctic char	2.425 (0.610)
<i>Salmo salar</i>	Atlantic salmon	0.033 (0.020)
<i>Anguilla anguilla</i> *	European eel*	30.887 (10.921)*

Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species (Connor *et al.*, 2017).

*Eel CPUE and BPUE based on fyke nets only

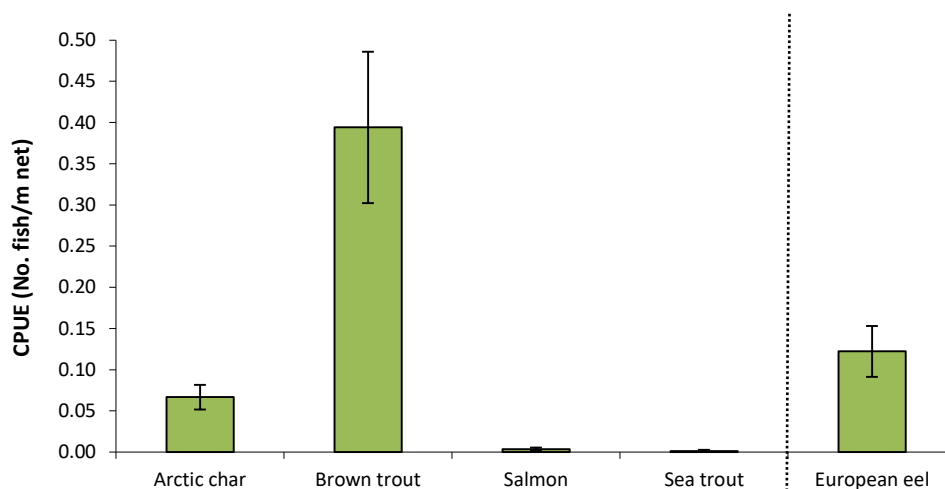


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Cloon Lough (Eel CPUE based on fyke nets only), 2019

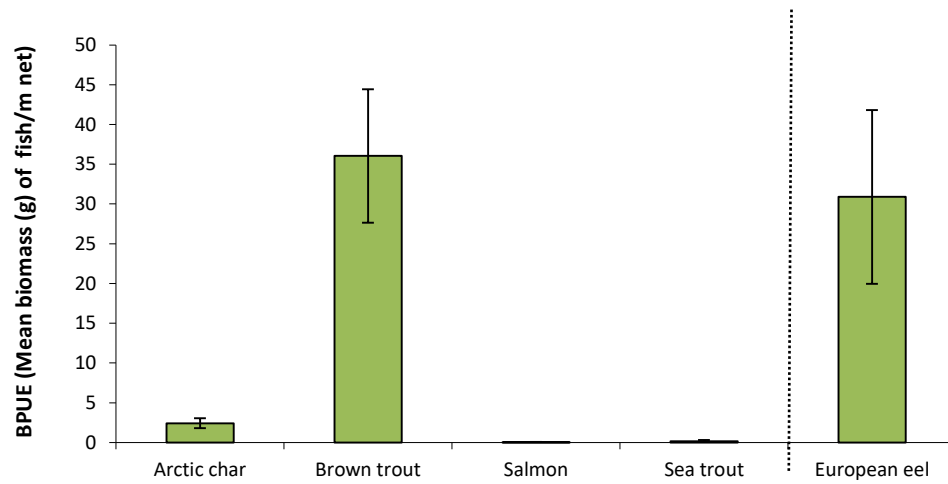


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Cloon Lough (Eel BPUE based on fyke nets only), 2019

1.3.3 Length frequency distributions and growth

Brown trout

Brown trout captured during the 2019 survey ranged in length from 8.0cm to 64.6cm (mean = 19.0cm). Five age classes were present, ranging from 1+ to 5+, with a mean L1 of 6.3cm. The dominant age class was 2+ (Table 1.3, Fig 1.4.). Mean brown trout L4 in 2019 was 24.1cm indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971) (Table 1.3).

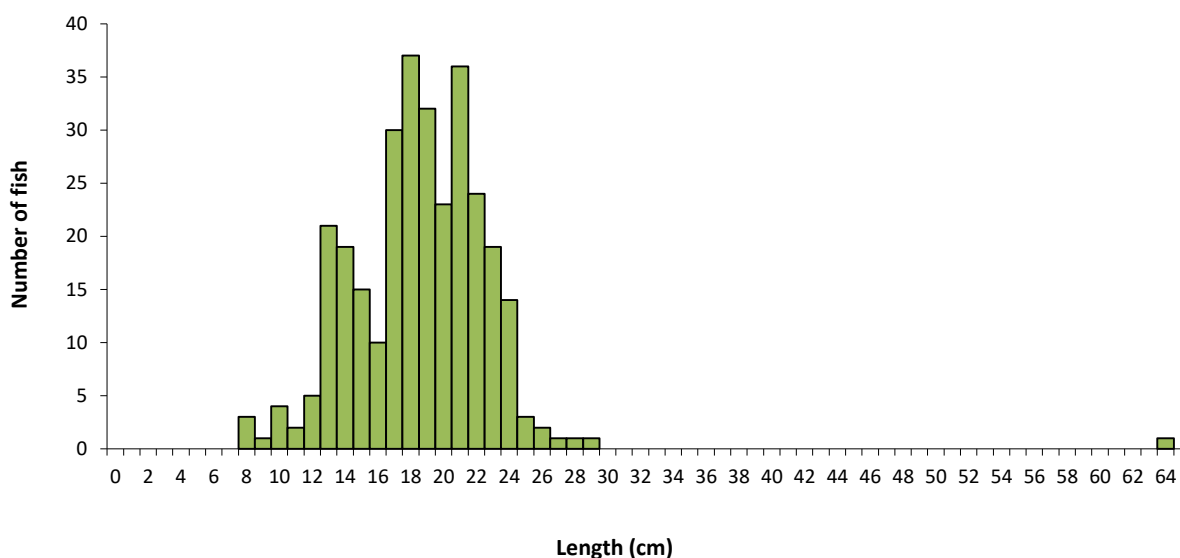


Fig. 1.4. Length frequency of brown trout captured on Cloon Lough, 2019

Table 1.3. Mean (\pm S.E.) brown trout length (cm) at age for Cloon Lough, September 2019

	L ₁	L ₂	L ₃	L ₄	L ₅	Growth category
Mean (\pm S.E.)	6.3 (0.1)	14.9 (0.3)	20.1 (0.3)	24.1 (1.2)	26.4	Slow
N	65	48	17	3	1	
Range	4.0-8.1	11.6-20.0	18.1-22.4	22.3-26.4	-	

Arctic char

Arctic char captured during the 2019 survey ranged in length from 6.2cm to 19.3cm (mean = 13.9cm) (Fig. 1.5). Five age classes were present, ranging from 1+ to 5+. The dominant age classes were 1+ and 4+.

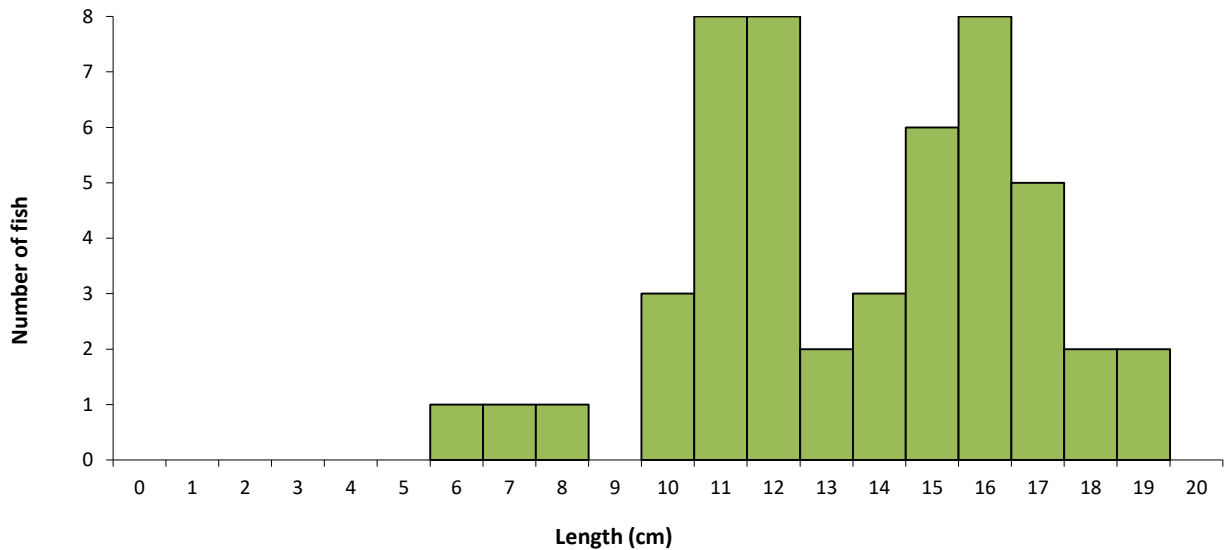


Fig. 1.5. Length frequency of Arctic char captured on Cloon Lough, 2019

Other fish species

European eels ranged in length from 35.0cm to 64.5cm. Three salmon were captured ranging from 8.9cm to 9.8cm and aged 1+. One sea trout measuring 23.0cm was also recorded.

1.3.4 Stomach and diet analysis

Dietary analysis studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items. The stomach contents of a subsample of brown trout and Arctic char captured during the survey were examined and are presented below.



Brown trout

Adult trout usually feed principally on crustaceans (*Asellus* sp. and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O'Grady, 1981). A total of 78 stomachs were examined. Of these 55 were found to contain no prey items. Of the remaining 23 stomachs containing food, 56% contained invertebrates, 26% contained digested material, 9% contained zooplankton and 9% contained fish (Fig. 1.6).

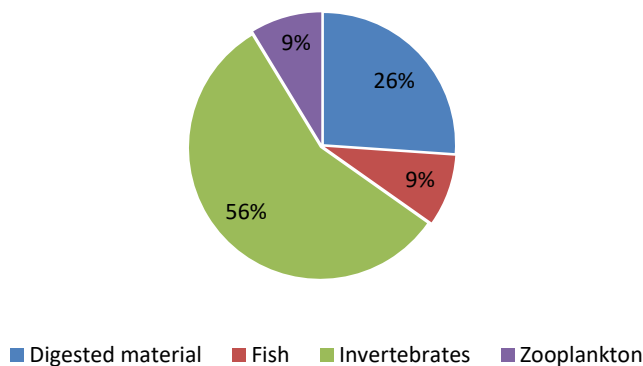


Fig 1.6. Diet of brown trout (n=23) captured on Cloon Lough, September 2019 (% FO)

Arctic char

A total of 22 Arctic char stomachs were examined. Of these 16 were found to contain no prey items. Of the remaining six stomachs containing food 67% contained zooplankton and 33% contained unidentified digested material (Fig. 1.7).

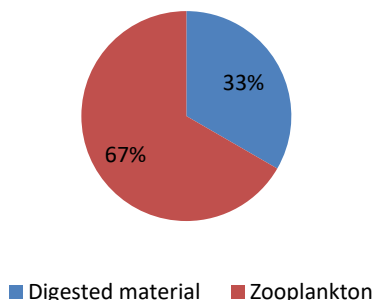


Fig 1.7. Diet of Arctic char (n=6) captured on Cloon Lough, 2019 (% FO)



1.4 Summary and ecological status

A total of four fish species (sea trout are included as a separate 'variety' of trout) were recorded in Cloon Lough in September 2019. Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2019 survey.

Brown trout ranged in length from 8.0cm to 64.6cm. Five age classes were present ranging from 1+ to 5+, indicating reproductive success in five of the six previous years. Length at age analyses revealed that brown trout in the lake exhibit a slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

Arctic char ranged from 6.2cm to 19.3cm in length. Five age classes were present ranging from 1+ to 5+, indicating reproductive success in five of the six previous years.

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows River Basin District managers to identify and prioritise lakes that currently fall short of the minimum "Good Ecological Status" that is required if Ireland is not to incur penalties. A multimetric fish ecological classification tool (Fish in Lakes – 'FIL') was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBNI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further developed during 2010 (FIL2) in order to make it fully WFD compliant, including producing EQR values for each lake and associated confidence in classification (Kelly *et al.*, 2012b). Using the FIL2 classification tool, Cloon Lough has been assigned an ecological status of Good for 2019 based on the fish populations present.



1.5 References

- Amundsen, P.A., Gabler H.M. and Staldvik F.J. (1996) A new approach to graphical analysis of feeding strategy from stomach contents data—modification of the Costello (1990) method. *Journal of Fish Biology*, **48**, 607–614.
- Caffrey, J. (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.
- Connor, L., Matson R. and Kelly F.L. (2017) Length-weight relationships for common freshwater fish species in Irish lakes and rivers. *Biology and Environment: Proceedings of the Royal Irish Academy*, **117** (2), 65-75.
- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.
- Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012b) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619.
- Kennedy, M. and Fitzmaurice, P. (1971) Growth and food of brown trout *Salmo trutta* (L.) in Irish Waters. *Proceedings of the Royal Irish Academy*, **71 (B) (18)**, 269-352.
- NPWS (2005) Site synopsis: *Killarney National Park, MacGillycuddy's Reeks and Caragh River Catchment*. Site code: 000365. Site Synopsis report, National Parks and Wildlife Service.
- O' Grady, M.F. (1981). *A Study of Brown Trout (Salmo trutta L.) Populations in Selected Irish Lakes*. Ph.D. Thesis, National University of Ireland.
- O' Reilly, P (2007) *Loughs of Ireland. A Flyfisher's Guide*. 4th edition. Merlin Unwin Books.

**Inland Fisheries Ireland
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland.
D24 Y265**

**www.fisheriesireland.ie
info@fisheriesireland.ie**

+353 1 8842 600

